AMENDED CLAIMS
received by the International Bureau on 29 May 2005 :
claim 1 and claims 3 to 7 are unchanged, claims 2 has been deleted.

Claims

[1] A motion converting mechanism comprising a reciprocating member (1) and a rotating member (7);
said reciprocating member (1) comprising at least two roller cam followers (5) in substantially constant distance from each other;
said rotating member (7) comprising a cam (9);
for each rotation of the cam (9) only one reciprocation of the reciprocating member (1) takes place;
characterized in that:
the centers of the roller cam followers follow curves, relative to the cam, having an eccentricity E(f) which is related to the displacement Y(f) of the reciprocating member (1) substantially by the formula:
E(f+f1)=square root ((a + Y(f))^2 +d^2), with f1=Arctan ((a+Y(f))/d), where f is the rotation angle of the cam, d is half the distance between the axes of reciprocation of the centers of the roller cam followers and a is a constant;
while Y(f)+Y(f+π)=constant for any f;
thereby the same cam profile desmodromicly controls the reciprocation in both directions.

[2] (cancelled)

[3] A motion converting mechanism according claim 1,
characterized in that:
the reciprocating member comprises at least one roller (4) riding either on an immovable surface (16) or on a rotating cooperating cam (11) and bearing thrust loads at low friction to improve mechanical efficiency and reliability.

[4] A motion converting mechanism comprising a reciprocating member, at least two rotating external cams, not necessarily of the same size or number of lobes, and at least a thrust wall;
characterized in that:
the reciprocating member comprises a roller cam follower assembly, trapped among the cams and the thrust wall.

[5] A motion converting mechanism according claim 1,
characterized in that:
the resulting side loads are substantially carried by the rolling of rollers on

angularly displaceable thrust walls in order to provide variable compression ratio.

[6] A motion converting mechanism comprising a reciprocating member and a rotating camshaft;
said camshaft comprising at least a first external cam and a second external cam;
said reciprocating member comprising a first roller cam follower and a second roller cam follower;
said first roller cam follower rides on said first cam with its center following a first centers curve relative to the camshaft;
said second cam follower rides on said second cam with its center following a second centers curve relative to the camshaft;
characterized in that:
the first cam and the second cam are complementary in the sense that any line from the center of rotation of the camshaft, intersects the first and the second centers curves in a sequence of four points A, B, C and D with AC=BD=constant and AB=CD.

[7] A motion converting mechanism for desmodromic control of reciprocating valves comprising:
at least a cam having an eccentric groove and at least a cam follower sliding along said eccentric groove in substantially permanent contact to both sides of the groove;
characterized in that:
the cam follower is substantially longer than the width of the groove.

Statement under Article 19(1)

The applicant thinks that solving / cracking a problem means finding the relation / equation between what is asked and what is given; between the unknown / desirable quantities and the known/given quantities.

The question has always been: what the profile of the cam must be in order to provide this / some / any desirable reciprocation.

Which implies that in the multi-cam arrangements of claims 4 and 6, since one / every cam defines the reciprocation function, which the others must follow, the only way to find them / others / latter is through the disclosed mathematical method; the equations of US4301776 constitute anything but solution; they simply propose / suggest one family of cams, including the cam of GB276774, out of the infinite-infinities of suitable / fit cams and there is no reason why a cam of the family of US4301776 cams imparts the desirable / optimum / efficient reciprocation to piston or valve at hands; this family constitute a very-small / infinitesimal number of the possible cams, among those the equations provide; the desirable reciprocation defines the cam, not vice-versa; unless the cams of US4301776 provide something special, over the rest infinite cams, nobody will pick any of them.

A client ordered cams providing constant acceleration to his pistons, the only way to produce / machining them, was the mathematical.

Yes, the linking concept defining the contribution over the prior art is the equations of claims 1,6.

No, every single point of both cams of Fig 49 is used and absolutely necessary.

As in the case of the conventional engine, where the thrust forces prevent / hinder / preclude / forbidden shorter connecting rods, Fig 31 proves that the same forces make the "substituting the rollers for the sliders" not an option / choice / selection but an unavoidable / inevitable necessity; without roller, to abut the thrust / side / lateral forces, the claimed engines are inferior / noncompetitive to conventional engine, because of the angles of the forces illustrated in Fig 31. The same thing, that renders the engine of Fig 16, 17 inferior to the engines of the prior art, renders the latter inferior to the claimed engine; the sliding / rubbing friction versus the rolling friction. US4301776 addresses this problem, by providing a second embodiment, by Fig 8,9 and claims 6,7, where rollers substitute the sliders. Claim 3 of the present application says the same thing "free the mechanism of any sliding / rubbing abutment; rolling abutment is necessary / inevitable; otherwise the mechanism is not competitive against the conventional crank-rod mechanism; everybody knows that any newcomer is either competitive to the conventional or useless / worthless / dead.

Fig. 16,17 lead to Fig 32 to 37 thus claim 7, for reduced dimensions and improved contact curvature and lightweight simply because the gas loads of a piston necessitate rollers whilst valve train needs, above all, be lightweight and compact.
The angularly displaceable thrust walls, Fig 46, provide variable compression claimed in claim 5.

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